

NEW CICADAS WITH NOTES ON NORTH AMERICAN AND WEST INDIAN SPECIES

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Among the eleven large black cicadas of the genus *Tibicen* to be found in the southeastern United States, two are known to vary to pronounced greener phases in the more southeasterly part of their range. *Tibicen chloromera* variety *australis* in Florida is a notably greener insect than specimens of *chloromera* from the middle states, and *Tibicen lyricen* variety *virescens* is shown in this paper to have a similar distribution. The small *Melampsalta calliope* varies to the green from *floridensis* in the same way.

The more western *Tibicen pruinosa* has been shown by Dr. Raymond H. Beamer to have a tan-colored variety in Kansas, which he has described as variety *fulva*, and in the writer's collection there is a male of this variety from San Antonio, Texas, collected in August, 1928. Likewise in the genus *Okanagana* in the west, if a species varies from the usual black or near black normal coloring, it is toward tan-colored forms, and not to green ones as in the southeast. Thus we have a number of tan-colored varieties of *Okanagana*, two of which have recently been named by F. H. Wymore in the Pan-Pacific Entomologist, October, 1934, pp. 167 and 174.

The mid-west has some green cicadas, as for example *Tibicen superba*, *Okanagana viridis*, *Okanagodes gracilis* var. *viridis*, *Melampsalta kansa*, and, in the Chisos Mountains of Texas, the green *Okanagodes terlingua* occurs.

The color in these naturally green cicadas, as in katydids and some other Orthoptera, can be preserved by soaking the specimens for a few days in one part formalin to nineteen parts water. Otherwise the color may and usually does gradually fade. Some of the specimens of *Okanagodes terlingua* mentioned in this paper were so treated, and now, after 10 months, they are bright

green in color, while those not so treated have faded to a yellowish green.

In the preparation of this paper I am indebted to Mr. George B. Wilmott for all but two of the photographs, and to Hans L. Stecher for the text figures.

***Tibicen latifasciata* Davis**

In my trip with Howard H. Cleaves to Southern New Jersey, August 22 to 25, 1932, I wished to learn if *Tibicen latifasciata* sang at twilight as does its close relative *Tibicen winnemanna*. We, however, heard it sing only when the sun was shining. At "Camp Two Katydids," on the morning of August 25, we heard one singing after the sun was well up, but we did not hear any during the previous evening.

We heard quite a number of *latifasciata*, but they were not as common as in August, 1910, when they also sang during the sunny hours of the day. The three that we saw, two at Reed's Beach and one at Town Bank, escaped.

It would appear that the beautifully marked *latifasciata* with its broad white stripes, and living close to the Atlantic Ocean from Cape May County, New Jersey, southward, should be considered as a distinct species from both *pruinosa* and *winnemanna*, and it is also of interest that it resembles *pruinosa* of the Mississippi River region more than it does *winnemanna* of the general region of the Blue Ridge Mountains.

***Tibicen lyricen* DeGeer and Its Varieties**

In their account of *Cicada lyricen* DeGeer, 1778 (*fulva* Osborn, 1906), in "Entomological News," April, 1907, Smith and Grossbeck record that they had for comparison 15 specimens of each sex collected from New York to Florida and westward to Indiana. They state: "The pronotum in some is all black, except for a broad central line, and the mesonotum in such is also black, with narrow fulvous lines indicating the usual pattern. In other examples fulvous is the predominating color, the black maculation being reduced, but the posterior and lateral borders of the pronotum are always black, except for a small spot which is sometimes present near the head. Green occasionally replaces

the fulvous and, rarely, both are present on the same insect, the fulvous occupying the lateral portions of the mesothorax, the green the remainder of the background."

The black individuals described above probably came from the uplands of Virginia southward into Georgia, and is now known as variety *engelhardti* Davis. It often presents a remarkable contrast to typical *lyricen*. The greener individuals mentioned by the authors very likely were the Florida examples referred to, and here described as a new variety.

Tibicen lyricen variety **virescens** new variety

Type male, Paradise Island, Homestead, Florida, August, 1919. Davis collection.

Allotype female, Gainesville, Florida, July 17, 1934 (M. E. Griffith). University of Kansas collection.

Pronotum with the color pattern of typical *lyricen*, except that the usual fulvous areas have a greenish tinge. The collar is black. On the mesonotum the obconical spots, a small spot each side, another at the base of each fore wing and a small area immediately anterior to the cruciform elevation, black. The remainder of the mesonotum is centrally green, fulvous or chestnut colored on the sides. The basal areas and the costal margin, of the fore wings, are often bright green, with the marginal areas clouded or smoky, much more so than in northern specimens. This beautiful variety, differing greatly in appearance from the nearly all black *engelhardti*, occurs along the coast to at least as far north as North Carolina.

The type is one of four specimens, all colored alike, and collected in August, 1919, near Homestead, Florida. They were sent for identification in 1920 by Prof. R. H. Pettit of the Michigan Agricultural College. The paratypes are: male, Paradise Key, Fla., July 16, 1919 (C. A. Mosier); female, "South Carolina"; male, Charleston, S. C., June, 1912 (W. H. Cogswell, Jr.), and female, Beaufort, N. C., September 10, 1913 (Francis Harper). Occasional examples of this variety, or at least specimens approaching it, have been examined from further north from Beaufort, all coming from near the Atlantic coast.

Tibicen resh Killed by the Long Horn Grasshopper or "Cricket," *Rehnia spinosa*

Under date of July 9, 1934, Mr. H. B. Parks, Chief of the Division of Agriculture, San Antonio, Texas, wrote me as fol-

lows: "Last night just at dusk I heard the note of *T. resh* in a guajillo bush just at the corner of the laboratory. In the midst of its song it started a peculiar note which sounded like a fly caught in a spider web. I started to find it and in pulling away the branches I was very much surprised to discover the cicada had been captured by one of those very large green, spinose crickets that are common some years here in Texas. I attempted to catch the pair but in the darkness I was unable to follow the cricket with its prey through the bush. I am in hopes that I can find the living cricket and the wreck of the dead cicada."

On August 8, Mr. Parks sent me another letter in which he continued: "The female cricket is the one about which I wrote you and in this letter you will find the evidence to prove the statement. You will have no trouble in identifying the species of cicada from the wing and the part of the abdomen enclosed. I found the remains of the cicada only a few feet from where I saw the cricket eating the cicada. You will note the mandible marks on the base of the abdomen."

The Shield-Bearer that killed the cicada is a large and powerful insect as big as the cicada itself, and in addition is armed with formidable jaws and long spinous legs. Being without wings it does not wander far, and when its green body lies stretched out along a limb, it has indeed a menacing appearance as the writer can testify from personal observation. From the remains of the cicada it would appear to be *Tibicen resh*, as identified by Mr. Parks.

***Tibicen marginalis* and *Tibicen dealbata*; their Relationship and Broods**

On August 8, 1934, Mr. H. B. Parks sent me 36 *Tibicen marginalis*. This insect had appeared in great numbers during part of July at Mitchell Lake; along San Antonio River, along Cibolo Creek and elsewhere near San Antonio, Texas.

It was evidently a Brood Year for the species in that part of Texas, and in one of his letters Mr. Parks stated that "one cannot carry on a conversation in the vicinity of where they are found for the noise. . . . During the period when these cicadas were obtained one could have secured literally thousands of them

had he had the time and the ability. Our long drought ended on the 26th of July and since that time I have heard no cicadas singing. As it ended with a Gulf storm I presume the fifty mile wind killed large numbers of insects." In a later letter he added that it was his belief that *marginalis* occurs only where willows are common. "I never have seen a specimen on any other kind of tree. They prefer the larger branches and always sit with their heads up the tree. While hunting them at Cibolo Creek twenty-five (all males) were killed from one tree and there were many other trees in the neighborhood which would have yielded a like number had the cartridges not run out."

In his "Biology of Kansas Cicadidae," University of Kansas, 1928, Dr. Raymond H. Beamer states that *marginalis* occurs in the eastern part of Kansas and that it is most commonly found in groves of willow and cottonwood along streams, although may be heard in other trees. He adds that: "The males are the most persistent and prolonged singers of any of the Kansas species. Their song begins as soon as the sun warms them in the morning and continues far into the night. Specimens have been heard as late as 1:30 o'clock in the morning."

The closely allied *Tibicen dealbata* also occurs in vast numbers at times and Miss Anna Bennett in 1916 sent me 302 specimens from Foss, western Oklahoma, with the statement that they had been "almost a pest" (see this JOURNAL, March, 1921, p. 47).

Dr. Beamer finds that in Kansas, *dealbata* occurs over the western two thirds of the state and practically always in trees along water-courses, willow and cottonwood being preferred. He adds: "While *Tibicen dealbata* (Davis) occurs west of *Tibicen marginalis* (Walker), and its emergence time is a little shorter (perhaps due to higher altitude), no difference has yet been detected in the behavior of the two. The song sounds identical, the habits of singing are the same, the nests of one might be mistaken for those of the other, the same types of hosts are used, and the time and method of hatching and the appearance of the eggs and nymphs are identical." He records a large brood of *dealbata* as occurring in Logan County, Kansas, in June, 1925.

Tibicen dealbata was described in 1915 as a variety of *marginata* Say = *marginalis* Walker, the type coming from Colorado.

It has the head narrower across the eyes than in *marginalis*; the fore wings are proportionately broader and are not so narrowed toward the outer extremities as in *marginalis*; a profile view shows the opercula extending further beyond the lower hind angles of the tympanal coverings immediately above them than is usual in *marginalis*. In *dealbata* the pruinose areas are conspicuous and usually well defined, and there is commonly a prominent dark band on the tergum containing a central row of white spots, while each side the abdomen is heavily pruinose. The uncus in *dealbata*, *dorsata* and *marginalis* does not differ greatly and is subject to some slight variations. In *dealbata* it is usually more narrowly wedged shaped when viewed from behind than in the other two species. Specimens of *marginalis* and *dorsata* are usually black behind the eyes, but those from southwestern Texas are pale. In *dealbata* the rear of the eyes is pale in Texas, Oklahoma, and Kansas specimens, with occasional exceptions, but black in those from Nebraska, Colorado and the Dakotas. Some of these characters are very plain when the insects are seen in series. (See figures in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY for 1915, plate 12, figures 1 and 2, and plate 18, figure 2.)

While the areas of distribution of the two species overlap, *marginalis* is found much further east than *dealbata*. It occurs in Iowa, Missouri, Arkansas, Louisiana and eastward to Ohio, Kentucky, Tennessee, Alabama and northwestern Florida. *Tibicen dealbata* is more common west of the Mississippi, from near the 100th meridian westward to the Rocky Mountains.

Tibicen minor Davis. Plate XV, Fig. 5

This species was described in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY for March, 1934, from Mexico, from the male type and four male paratypes. Recently Mr. E. P. Van Duzee sent me a male and female from Basuchil, Chihuahua, Mexico, August 29, altitude 6,700 feet (Mrs. Y. Mexia, collector).

The female closely resembles the male type, except that it is larger, expanding 57 instead of 47 millimeters. The basal areas of all of the wings are pale orange, and the notch in the last ventral segment is broad and single, that is there is not one notch

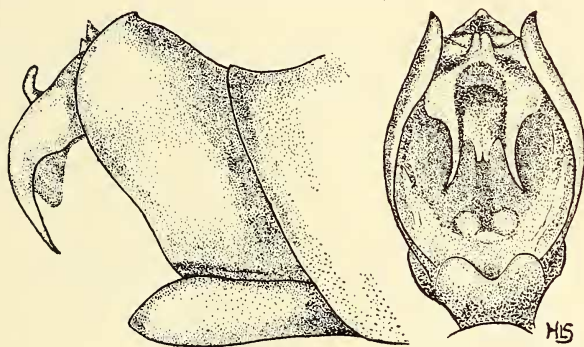
within the other. The head is much broader and the sides of the abdomen much more extensively pale than in *Tibicen hilaris* as described and figured by Distant in Biol. Centr.-Americana (1881). With the exception of segments one and two the sides of the abdomen are pale and pruinose.

Diceroprocta canescens new species. Plate XIII, Figs. 1 and 2.

Type male and allotype female from San Vincente, Brewster County, Texas, June 24, 1934. (C. H. Gable, Jr.). Davis collection.

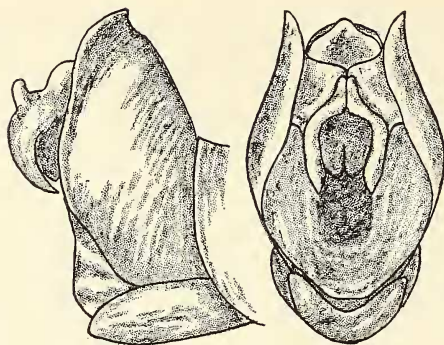
An orange and black species with clear wings resembling *Diceroprocta eugraphica* described and figured in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY, March, 1916, but generally larger and more canescent. The front of the head is more prominent and the curved claws of the uncus are very much longer than in *eugraphica*. The following description is copied largely from that of *eugraphica*, changed where necessary to cover *canescens*.

Head black with an orange spot above the base of each antenna and a larger one each side nearer the eyes; also one each side contiguous to the hind margin. The transverse rugæ black, with an orange spot on front of



DICEROPROCTA CANESCENS

head. Pronotum orange and black, the central longitudinal stripe conspicuously orange with a dissected black band each side, which is widened anteriorly and posteriorly; grooves blackened; collar orange, irregularly blackened along the front margin, also at the humeral angles. Mesonotum with four obconical black spots, the inner pair short, the outer pair longer and extending backward to the elevated \times . There is also a black stripe extending along each side from the \times to the base of each fore wing. Between the \times and the two central obconical spots, there is an irregular cross-shaped spot, and the two depressed black points, common to many species, and near to the anterior extremities of the \times , are also present. The \times and lighter



DICEROPROCTA EUGRAPHICA

lines on the mesonotum are orange. The tergum is a dark brown, conspicuously covered with a fine, white, silvery pubescens. The area at the base of the abdomen between the tympana is conspicuously hoary, which is not so in *eugraphica*. Segments narrowly edged with orange posteriorly. Fore wings with their costal margins orange for about half of their length, beyond which they are blackened; the subcostal veins are very dark brown or black. First and second cross veins of the fore wings are not clouded; both pairs of wings are orange at the base with the anal areas grayish white. Beneath lighter colored and pruinose, the legs orange, streaked and spotted with testaceous. Abdomen with the segments darkened along each side. Opercula pale; straw colored; a little less than half as long as the abdomen and rounded at the extremities, the inner edges touching or nearly so. The uncus is as figured, and for comparison the figure of *eugraphica* is reproduced.

MEASUREMENTS IN MILLIMETERS

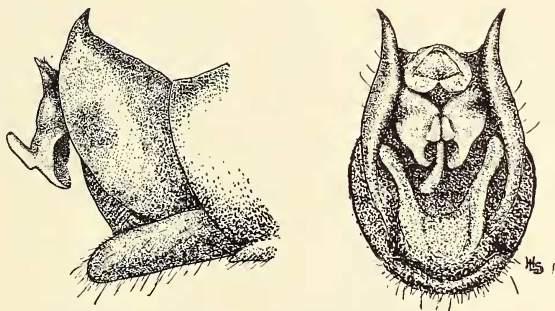
	Male Type	Female Allotype
Length of body	30	25
Width of head across eyes	11	10
Expanse of fore wings	78	75
Greatest width of fore wing	12	11
Greatest length of operculum	6

In addition to the type and allotype, the following specimens are in the writer's collection: 15 males from San Vicente, June 24, 1934; 5 males, 50 miles south of Marathon, June 27, 1934, and 1 female from a few miles north of the Chisos Mountains, June 27, 1934. These localities are in Brewster County, Texas, and the specimens were collected by C. H. Gable, Jr.

The writer has about 350 specimens of *D. eugraphica* from Kansas, Oklahoma, Arizona, New Mexico and Texas. He and others have collected specimens of *eugraphica* close to the Texas localities where *D. canescens* was found in 1934, but nothing was learned of that insect before that year when one of its broods may have appeared. Mr. Gable found both *eugraphica* and *canescens* at San Vincente on the 24th of June, 1934.

Diceroprocta biconica Walker, of Cuba, and Closely Related Species

Cicada biconica was described from Cuba in "List of the Specimens of Homopterous Insects in the Collection of the British Museum," Part 1, 1850. Some of the characters mentioned by Walker were: Body ferruginous above, tawny and powdered with white beneath, hind margin of pronotum pale green; mesonotum adorned with two obconical pithy stripes which are united on the fore border and extend about half the length; wings colorless, fore border green, black towards the tips, first and second cross veins and tips of first and second longitudinal veins clouded with brown. Length of body $13\frac{1}{2}$ lines; of the wings [expanse] 45 lines or nearly 100 millimeters.



DICEROPROCTA BICONICA

In 1926 Mr. W. E. China of the British Museum kindly sent me a photograph of the female type of *biconica* here reproduced. Plate XIII, Figs. 3 and 4. In the writer's collection there are the following specimens like the one figured, all from Oriente Province: male, Santiago, Sept. 15, 1903; female, Baracoa, Sept.,

1915, and two males, Guantanamo, June 1, 1916 (C. T. Ramsden), one of which is figured on Plate XIII, figures 5 and 6.

In Genera Insectorum, Plate 4, Fig. 24, 1912, Distant figured a male cicada as *biconica*, which the writer in this JOURNAL for March, 1930, described and figured as *Diceroprocta cleavesi* from Grand Cayman Island south of Cuba. Also in this JOURNAL for 1932, p. 246, twenty additional specimens of *cleaveri* are recorded from Grand Cayman and the characters of the species reviewed.

Diceroprocta (*Cicada*) *bonhotei* from Nassau, Bahama Islands, was described by Distant in "Entomologists' Monthly Magazine" (2), Vol. XII, p. 71, 1901, and although Distant did not record the fact, *bonhotei* in size and markings closely resembles *biconica* of Cuba. The females of *biconica* are said to have the spine at the tip of abdomen straight, that is not bent upward as is usually the case in females of *bonhotei*. The pruinose markings also appear to differ. A figure of the type of *bonhotei* from a photograph furnished by Mr. China appeared in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY for December, 1928, Plate XVII.

In Florida there is a cicada that has been identified as *D. biconica*. In the "Transactions of the Maryland Academy of Sciences," 1892, P. R. Uhler reports having examined a *biconica* from "southern Florida." After comparing twenty specimens collected on August 9, 1930, by Dr. Raymond H. Beamer and his three companions from the University of Kansas on Key Largo, Florida, and others taken elsewhere along the same coast, it was found that in the Florida specimens the terminal dorsal spine on the last abdominal segment of the females varied, and that the specimens, when viewed together, more strongly resembled those from the Bahamas than from Cuba, as stated in this JOURNAL for June, 1932.

On July 23, 1934, Dr. Beamer and his associates once more visited the Florida coast and collected 29 male and 19 female *Diceroprocta* on Key Largo and on Second Key. Again we find the terminal dorsal spine of the females variable, and in the pruinose markings of the males, especially the conspicuous white area at the base of the abdomen between the tympanal coverings, more like Bahama specimens than those from Cuba. In some of

this extensive series the colors are dark, but they all have a rusty brown appearance and the triangular opercula are somewhat variable.

It is possible that when the habits and songs of these insects are compared, that they will become more readily separable, as in the case of some individuals of *Tibicen canicularis* and *Tibicen linnei* in North America, which often resemble each other quite closely but sing quite differently, and have somewhat different habits.

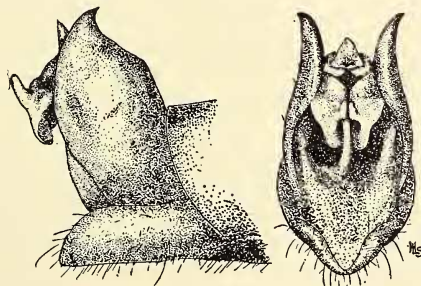
Returning to a consideration of the Cuban specimens the writer is of the opinion that there is a well marked variety of *Diceroprocta biconica* which may prove in time to be a separate species.

Diceroprocta biconica variety **obscurior** new var. Plate XIV, Figs. 1, 2 and 3

Type male and allotype female from near Santa Fe Beach, Punta Brova, Habana Province, Cuba, June, 1934. Davis collection.

Smaller than *D. biconica*; almost black and with the pruinose areas differently arranged (see plates).

Front of the head prominent; eyes prominent and median sulcus shallow. Slightly broader across the collar than across the eyes. Costal margin of the fore wing beyond the radial area slightly more bent than in *biconica*, quite apparent when viewed in series. Opercula triangular as in *biconica*; reaching the fourth abdominal segment in the type but slightly shorter in some of the paratypes. Terminal dorsal spine of the last abdominal segment of the female short, and with a slight upward bend. Head and pronotum very dark brown, variegated with black as in *biconica*; collar green; the four obconical spots reaching backward from the front margin of the mesonotum strongly marked. In *biconica* the central pair are often the only ones present and generally they are but faintly represented. Tympanal



DICEROPROCTA BICONICA VAR. OBSCURIOR

coverings black with the pruinose space between containing two prominent white dots. The abdomen with segments 3, 4, 7 and 9 with pruinose areas each side, and the dorsum of segment 8 almost entirely pruinose. In the males of *biconica* the pruinosity is much more extended as shown on the plate. Beneath the abdomen is pruinose along the sides, leaving a central dark brown stripe. The wing venation is much darker in variety than in *biconica*, and the first and second cross veins more prominent.

MEASUREMENTS IN MILLIMETERS

	Male Type	Female Allotype
Length of body	29	26
Width of head across eyes	12	11
Expanse of fore wings	86	84
Greatest width of fore wing	13	12
Greatest length of operculum	9

In addition to the type and allotype, one male collected in June, and six males collected October 10, 1934, at the same locality, were sent to me by Brother Chrysogone.

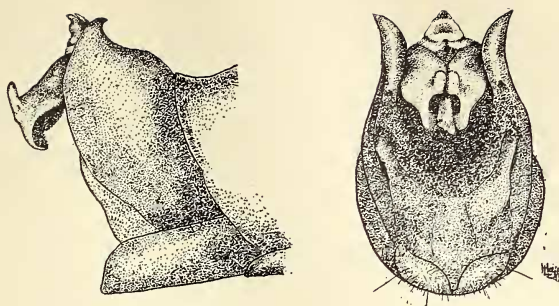
In the writer's collection there is a cicada from the Isle of Pines, about fifty miles south of Cuba, which is distinct from *D. biconica*.

Diceroprocta pinosensis, new species. Plate XIII, Figs. 7 and 8.

Type male, Santa Barbara, Isle of Pines (George Y. Payzant). Davis collection.

Differs from *biconica* in having a much narrower head; the rounded opercula black on the inner margins, and the basal area of the fore wing rather broadly black at its outer anterior margin.

Front of head more prominent than in *biconica*, mainly black with paler areas over the antennæ and on the posterior margin. Pronotum brown, with the grooves black, collar green narrowly black along the anterior margin and each side near the base of the wings. Mesonotum dark brown, the obconical spots black; cruciform elevation pale. Abdomen brown, anterior margin of each segment darker; tympanal coverings black; first segment with two pruinose dots; segments 2 to 7 pruinose each side leaving a central, dorsal brown area with nearly parallel sides; segment 8 pruinose, black on anterior margin. Beneath, head nearly black about the eyes and much darker than in *biconica*. Opercula pale straw-color, black at extreme base and on the inner overlapping margins; abdomen black at base, brown centrally and pruinose along the sides, the last ventral segment black at the rounded extremity; valve black.



DICEROPROCTA PINOSENSIS

MEASUREMENTS IN MILLIMETERS

	Male Type
Length of body	32
Width of head across eyes	12.5
Expanse of fore wings	98
Greatest width of fore wing	13
Greatest length of operculum	9

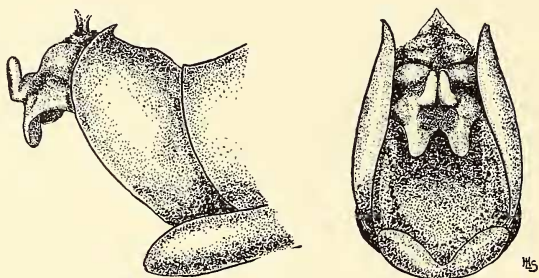
The type is an old specimen from which the wings on the left hand side have been broken. In some respects it resembles *D. cleavesi* from Grand Cayman Island, but it has shorter and more rounded opercula, edged with black in the inner margins, instead of entirely pale; it is dark gray and black at base of wings instead of orange, and the dorsal dark area on the abdomen has the sides nearly parallel and not oval in shape as in *cleavesi*.

***Diceroprocta ornea* Walker.** Plate XIV, Figs. 4 and 5.

In 1850 *Cicada ornea* was described from "Mexico" in List of Homopterous Insects in the collection of the British Museum. Some of the characters mentioned by Walker were: Scutcheon of the middle-chest [mesonotum] adorned with several tawny marks; a middle pair curved and widened at one end; a net-work mark on each side, and an oblique stripe near each side of the chest; two tawny spots above the cross-ridge which is tawny and has a pitchy spot in the middle . . . abdomen pitchy, a little longer than the chest; opercula [dorsal tympanal coverings]

large, close, reddish-pitchy; drums [opercula] pale yellow, large, triangular, more than half the length of the abdomen . . . wings colorless; fore border green, tinged with tawny as far as the brand . . . first and second cross-veins slightly clouded with brown; fore-flaps grayish brown; hind-flaps grayish brown at base and along the veins.

In 1881 Distant figured Walker's type of *ornea* in Biol. Centr. Am. Rhynchota Homoptera. The figure shows numerous marks on the mesonotum, and the very long pale opercula mentioned in the original description are also shown, but the head, as figured, appeared to be extraordinary.



DICEROPROCTA ORNEA (WALKER)

Mr. W. E. China, of the British Museum, has recently examined the type of *ornea* and writes that: "The figure in the Biologia is very bad and positively inaccurate. Under separate cover I am sending you as a loan a specimen of *Diceroprocta ornea* Walk. It differs from the type only in the slightly fewer pale markings on the mesonotum. Otherwise it is identical with type."

The specimen from Dr. Swale loaned by the British Museum is figured on Plate XIV, Figs. 4 and 5, and in the writer's collection there is a male like it in every respect from Guadalajara, Mexico, 1901 (M. Diguët). Both of these specimens are rusty brown in color; have prominent eyes, but proportionately narrower heads and longer opercula than in the usually darker *Diceroprocta semicincta* from Arizona, etc., described and figured in this JOURNAL, March, 1925. Also in *semicincta* the outer sides of the opercula converge, whereas in *ornea* they are nearly parallel.

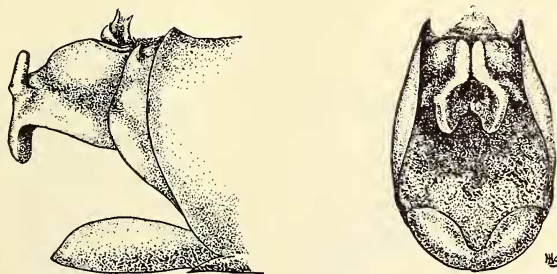
Diceroprocta fraterna, new species. Plate XIV, Figs. 6 and 7.

Type male from near Compostela, Nayarit, Mexico, April, 1934. Davis collection.

Resembles in size and general color *Diceroprocta semicincta*, and *D. ornea* as here figured but differs in the shape of the uncus and in color pattern.

Head with eyes not prominent and but little wider than front margin of pronotum and not as broad as hind margin. The large opercula slightly overlap on the inner sides near the base; the outer sides are parallel for part of their length, and the attenuated points reach the seventh segment. In some of the paratypes they do not go beyond the sixth segment, and are somewhat broader. Uncus as figured.

Head olive green and black; the transverse ridges of the front olive green and the grooves between them black; a broad irregular black band in which the ocelli are included, connects the eyes, and each side on the hind margin between the eyes and the ocelli there is a black spot. Pronotum olive green and black, the central longitudinal mark or stripe widened at both extremities. On each side there is a shorter, oblong spot parallel to the central one and the grooves are irregularly blackened. Collar olive green with the black band of the anterior margin extending to the base of the wings. Mesonotum black with two curved narrow pale marks extending backward from the front margin and widened at the extremities near the X elevation, which is pale in color, as is also the hind margin. Each side near the wings there is a short pale spot, and in some of the paratypes there are two spots between the fore limbs of the X. Abdomen above, including tympanal coverings, shining black, with a few silvery hairs each side particularly on segment three. Fore wings with the costal margins olive green to end of radial area; beyond black. First and second cross veins slight clouded. A conspicuous oblong spot at the anterior margin of the basal cell and the posterior margin of the anal cell black. Anal membranes of both pairs of wings gray, or grayish white. Beneath, pronotum and mesonotum yellowish white, the legs variegated with black or dark brown and yellow. Opercula pale, almost white, narrowly darkened at extreme base. Underside of the abdomen black or



DICEROPROCTA FRATERNA

nearly so, causing by contrast in color the small white spots each side at the spiracles on segments three to seven inclusive, to become conspicuous. If the position of the opercula permit, white spots will be seen in each of the cavities which they ordinarily cover. The white spots at the spiracles occur in numerous *Diceroprocta*, but in this species they are more conspicuous than usual.

MEASUREMENTS IN MILLIMETERS

	Male Type
Length of body	23
Width of head across eyes	9
Expanse of fore wings	72
Greatest width of fore wing	11
Greatest length of opereulum	9

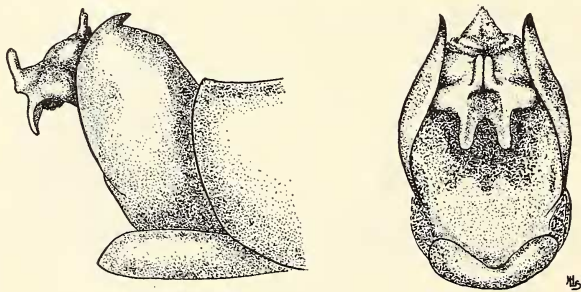
In addition to the type, five males collected at Compostela, April, 1934, have been examined.

Diceroprocta bicolor, new species Plate XV, Figs. 1 and 2.

Type male from Jojutla, Morelos, Mexico, June, 1929. Davis collection.

Head across eyes much broader than the front margin of the pronotum and about as broad as the hind margin; eyes prominent; front moderately produced and somewhat angulated; median sulcus shallow. The long opercula touch on the inner side near the base, the outer sides are nearly parallel for part of their length, and the attenuated points reach the seventh abdominal segment. In one of the paratypes they reach the eighth segment. Uncus as figured.

Head yellowish green and black; the transverse ridges of the front yellowish green with the grooves between them black; a broad irregular black band in which the ocelli are included, connects the eyes, and each side on the hind margin between the eyes and ocelli there is a black spot. Pronotum olive green, brown and black, the central longitudinal mark pale centrally and



DICEROPROCTA BICOLOR

widened at the extremities. On each side there is a shorter oblong spot, parallel to the central one and the grooves are irregularly blackened. Collar olive green very narrowly edged with black on the front margin, and a small black spot near base of each fore wing. In one of the paratypes the collar is entirely green except for the small dark spot near the extremities. Mesonotum greenish brown with four obconical blackish spots extending backward from the front margin, the inner pair shortest, black and unbroken, the outer pair brown and much lacerated. The depression in front of the cruciform elevation or X, contains a large, irregular black spot with an attenuated line leading forward between the inner pair of obconical spots. A curved black band crosses the fore limbs of the X and extends to the base of each front wing. The posterior margin of the mesonotum is olive green. Abdomen black with the tympanal coverings narrowly brown on the anterior margins, and the sides of segments eight and nine pale. Under side with the front blackish, the pronotum and mesonotum paler; legs pale, striped with brown. The very long opercula yellowish white on about the outer half and black on the inner half. The abdomen is chocolate brown with a pale spot each side on segments seven and eight, and the spiracles on segments three to eight whitish.

MEASUREMENTS IN MILLIMETERS

	Male Type
Length of body	23
Width of head across eyes	10
Expanse of fore wings	73
Greatest width of fore wing	11
Greatest length of operculum	9

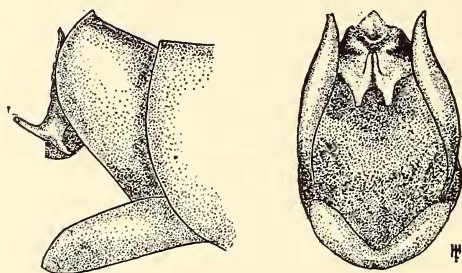
In addition to the type the following have been examined: Male labeled "Mexico," closely resembling the type except that the opercula are even longer and the outer sides more parallel to each other; a smaller male expanding 63 millimeters from Manzanillo, Mexico, July 22, 1924 (Stephen E. Aguirre) and a female labeled "Matamoros, Pueb.," Mexico, expanding 72 millimeters, that may belong to this species. The under side of the abdomen instead of being almost completely chocolate brown, has a broad yellow band each side of a central brown area.

Diceroprocta oculata, new species. (Plate XV, Fig. 6).

Type male from Compostela, Nayarit, Mexico, August 20, 1933. Davis collection.

Head across the eyes much broader than the front margin of the pronotum

and about as broad as hind margin; eyes prominent; front moderately produced and somewhat angulated (not rounded); median sulcus shallow and broad, with the transverse ridges pale and the grooves between them brown. The opercula triangular touching at base on inner margin, and with the rounded extremities reaching the fourth abdominal segment. Last ventral segment broadly rounded, truncate or shallowly sinuate at the extremity. Uncus as figured.



DICEROPECTA OCLATA

Body above pale brown, head yellowish brown, dark brown at front and about the ocelli. A brown spot touching each eye, with several minute spots between the eyes and ocelli. Pronotum pale brown with an hour-glass shaped spot centrally and a shorter dark spot each side parallel to the central spot. Grooves clouded. Hind margin or collar green, or greenish brown in the paratypes. Mesonotum greenish brown with four obconical brownish spots (the outer pair longest) extending backward from the front margin toward the green cruciform elevation. A small dark spot each side at the extremities of the anterior pale limbs of this elevation. The posterior margin of the mesonotum is pale. Abdomen brown; tympanal coverings slightly paler. Under side pale brown; a shining black spot each side extending from the antenna to the eye. Legs pale; opercula pale or greenish; abdominal segments pale brown. Fore wings clear; costal margin greenish; basal cell clear; anal areas gray. Hind wings clear, anal areas grayish.

MEASUREMENTS IN MILLIMETERS

	Male Type
Length of body	18
Width of head across eyes	7
Expanse of fore wings	52
Greatest width of fore wing	8
Greatest length of operculum	5

In addition to the type two paratypes from Compostela, Nayarit, Mexico, are in the writer's collection.

PROARNA

Entomologists have found much difficulty in identifying some of the species placed in this genus, and there is evidently considerable confusion in the use of the various names.

In any collection of Cicadas female specimens of *Proarna* are likely to far outnumber the males. At Suretka, Costa Rica, in April, 1917, the late Alanson Skinner collected for me, chiefly at light, 55 specimens of one species, all of which were females but one. In 1927 I received for examination from the University of Michigan 57 specimens of *Proarna insignis* Distant, collected in the Dept. Magdalena, Columbia, May and June, 1926. In this lot there was but a single male. In connection with other characters the shape of the last ventral segment in the female, including the notch, will help in separating the species, even if satisfactory names cannot at present be assigned to all of them.

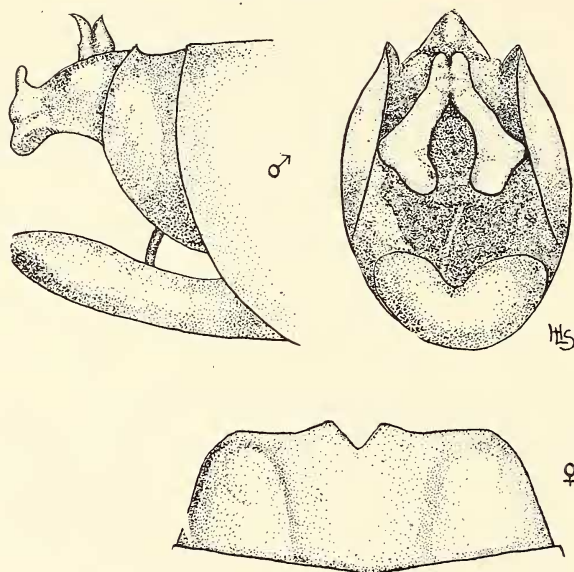
Through the kindness of Mr. Edward P. Van Duzee, I have received two male *Proarna* from Cocos Island which represent a different species from those of the mainland of Costa Rica to which the Island belongs. In the following description it is compared with the above mentioned male from Suretka, Costa Rica, which it most closely resembles. This specimen was sent to the British Museum in 1927, and found by Mr. W. E. China to be under *germari* in that collection. In Homoptera Indina, 1907, A. Jacobi describes and figures what appears to be a somewhat different *Proarna* as *germari* Distant, but this is still more unlike the specimens from Cocos Island, which lies about 400 miles from the mainland and might well have an endemic cicada.

Proarna cocosensis, new species. (Plate XV, Fig. 3).

Type male, Cocos Island, July 18, 1905 (F. X. Williams), collection California Academy of Sciences, and allotype female, Cocos Island, April 19, 1930, found dead in a damaged condition by Dr. James P. Chapin and now in Davis collection.

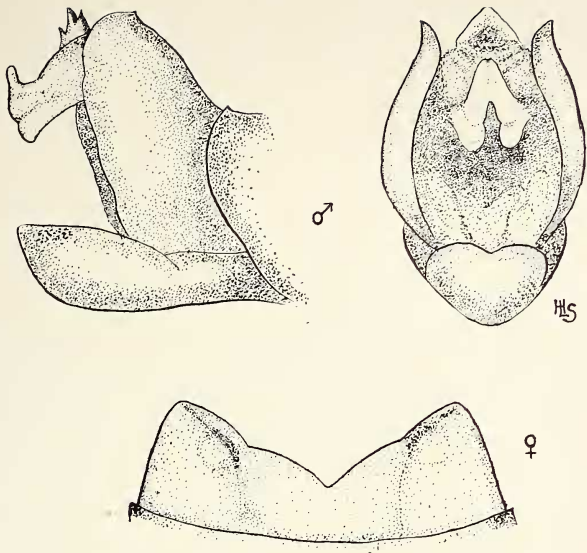
Resembles the male from Suretka, Costa Rica, identified provisionally as *Proarna germari*, but differs in having larger and more prominent eyes; a differently shaped uncus as here figured; more pointed fore wings and vein Cu 1b much heavier.

Front of head rounded, median sulcus shallow and eyes conspicuous by reason of their size. Opercula with the outer margins more sinuate and revolute, and not as rounded at the extremities. Last ventral segment with a shallow sinuation at the extremity; in the allotype this segment is shaped as illustrated. Uncus as illustrated, and of the same general form as the Suretka male and differing greatly from the *Proarna albida* or *insignis* type.



PROARNA COCOSENSIS

Head green with four black spots between the eyes—one above each antenna and one each side of the frontal sulcus. Ocelli in an irregular blackened area, and a very small spot each side near the hind margin. Pronotum green with a central, hour-glass shaped area outlined in brown, present in the allotype but not in the paratype. Grooves in type and paratype brown or nearly black; collar and sides bright green. Mesonotum greenish with four obconical spots extending backward from the front margin, the outer pair longest and broken centrally. A crescent-shaped spot behind the central and shorter pair. The X green with a small spot each side near the anterior extremities. Abdomen brownish green, each side with pruinose areas particularly on segments one, two, five, six and seven; segment eight more pruinose centrally. Under side pale greenish about the transverse rugæ and femora; opercula uniformly pale green; abdomen brownish green and sparsely pruinose.



PROARNA GERMARI?

Fore wings with the costal margin greenish to end of radial cell, darker beyond. The first transverse vein and the veins at base of all of the marginal areas slightly clouded. A row of spots along the outer margin; usually one to each area. The transverse nodal line well marked, ending with the rather heavy Cu 1b. Basal cell but slightly clouded at the outer extremity; anal area gray; base of wings greenish or bluish-green. Hind wings clear except at base; anal area nearly white, or clouded along margins.

MEASUREMENTS IN MILLIMETERS

	Male Type	Female Allotype
Length of body	20	22
Width of head across eyes	7	8
Expanse of fore wings	59	about 65
Greatest width of fore wing	9	10
Greatest width of operculum	4	

Okanagodes terlingua Davis. Plate XV, Fig. 7.

This species was described and figured in this JOURNAL for June, 1932, from the type and a single male paratype collected at Ter-

lingua, Brewster County, Texas, July, 1931, by C. H. Gable, Jr. In their visit to western Texas in 1934, Mr. Gable and his son C. H. Gable, Jr., made a special effort to collect *O. terlingua*, with the result that 11 males and one female were found at Terlingua, June 20 and a single male at San Vincente, June 22.

These specimens are green in color and otherwise closely resemble the type in the shape of the uncus, in the small head with the front less protruding than in *gracilis*, and in having vein Cu 1b of the fore wing almost straight; in *gracilis* it is considerably curved.

The only female of *terlingua* thus far seen is here figured and can be separated from *gracilis* and its varieties by the characters given above. The specimen is practically all green in color, except for the dark veins surrounding the marginal areas of the fore wings. The measurements in millimeters are as follows: Length of body 16.5; width of head across eyes 4; expanse of fore wings 45; greatest width of fore wing 8.

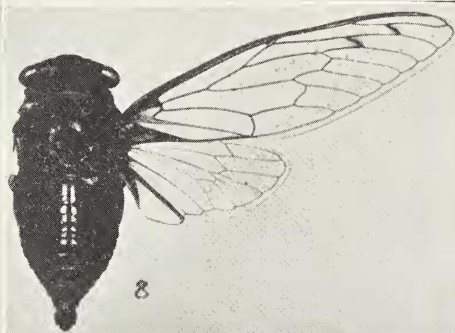
Platyedidia latipennis Davis.

This species was described and figured in this JOURNAL for March, 1921, from a single male collected at Douglas Spring, Routt County, Colorado, June 26, by J. W. Frey. The type, by permission of Prof. T. D. A. Cockerell was placed in the collection of the American Museum of Natural History.

On June 12, 1931, Prof. George F. Knowlton, of the Utah Agricultural College, collected a male on a Russian thistle at Vernal, Uinta County, Utah, and recently sent it to me for determination. This second known specimen agrees closely with the type, and has the same shaped broad fore wings and uncus.

PLATE XIII

- Figure 1. *Diceroprocta canescens* new species. Type.
Figure 2. *Diceroprocta canescens* new species. Allotype.
Figure 3. *Diceroprocta biconica* (Walker). Female. Type in British Museum.
Figure 4. *Diceroprocta biconica* (Walker). Type. Underside.
Figure 5. *Diceroprocta biconica* (Walker). Male. Eastern Cuba.
Figure 6. *Diceroprocta biconica* (Walker). Underside enlarged. Eastern Cuba.
Figure 7. *Diceroprocta pinosensis* new species. Type. Underside enlarged.
Figure 8. *Diceroprocta pinosensis* new species. Type.



CICADIDÆ

PLATE XIV

- Figure 1. *Diceroprocta biconica* var. *obscurior* new variety. Type.
Figure 2. *Diceroprocta biconica* var. *obscurior* new variety. Allotype.
Figure 3. *Diceroprocta biconica* var. *obscurior*. Type. Underside enlarged.
Figure 4. *Diceroprocta ornea* (Walker). In British Museum.
Figure 5. *Diceroprocta ornea* (Walker). In British Museum. Underside enlarged.
Figure 6. *Diceroprocta fraterna* new species. Type.
Figure 7. *Diceroprocta fraterna* new species. Type. Underside enlarged.

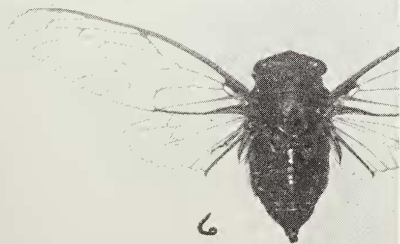
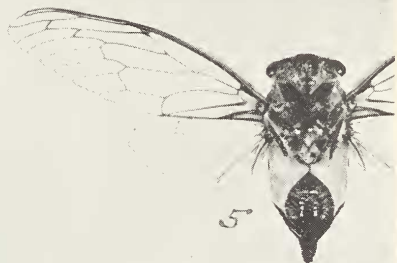
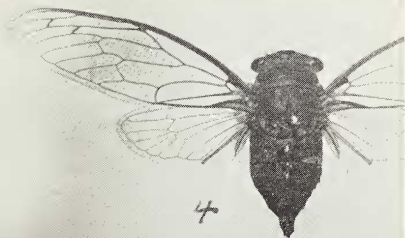
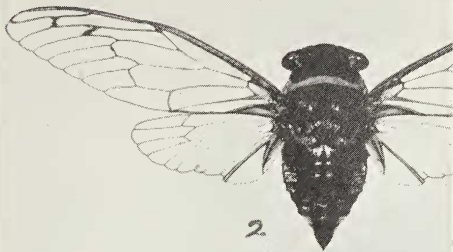
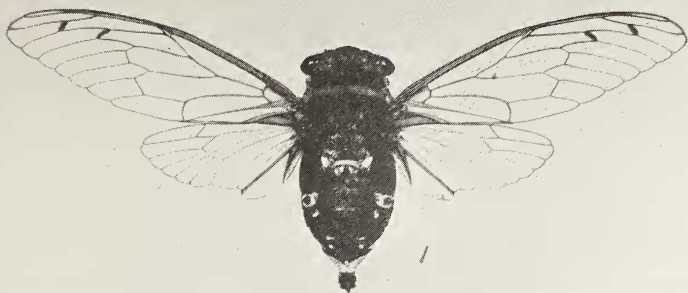
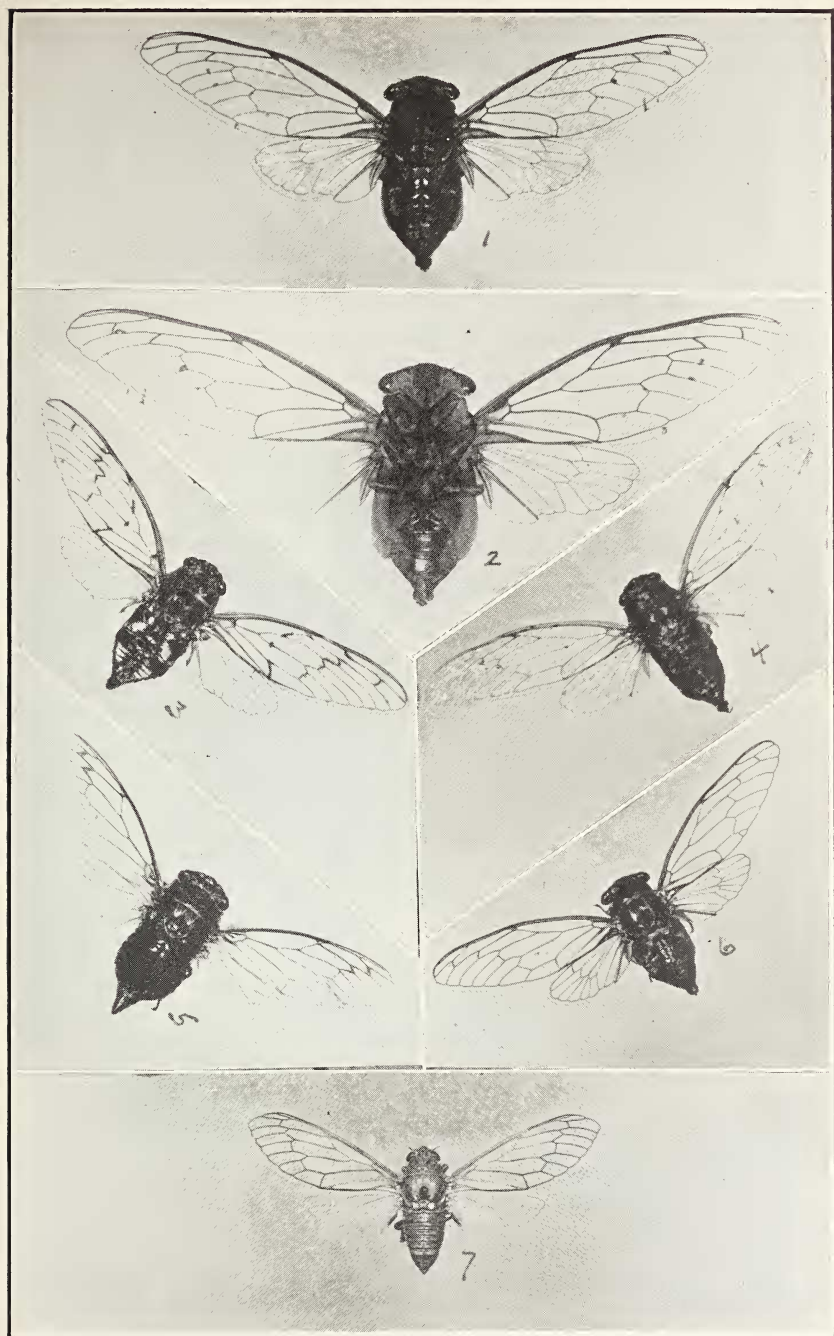


PLATE XV

- Figure 1. *Diceroprocta bicolor* new species. Type.
Figure 2. *Diceroprocta bicolor* new species. Type. Underside enlarged.
Figure 3. *Proarna cocosensis* new species. Type.
Figure 4. *Proarna germari* Distant. Costa Rica.
Figure 5. *Tibicen minor* Davis. Female.
Figure 6. *Diceroprocta oculata* new species. Type.
Figure 7. *Okanagodes terlingua* Davis. Female.



CICADIDÆ